



KRAMER ELECTRONICS LTD.

# USER MANUAL

MODEL:

**VS-88HN**  
8x8 HDMI Matrix Switcher

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P/N: 2900-300155 Rev 8

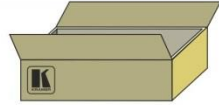


## VS-88HN Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to [http://www.kramerelectronics.com/support/product\\_downloads.asp](http://www.kramerelectronics.com/support/product_downloads.asp) to download the latest manual or scan the QR code on the left.

### Step 1: Check what's in the box

- ✓ VS-88HN 8x8 HDMI Matrix Switcher
- ✓ 1 Quick Start Guide
- ✓ 1 Power cord
- ✓ 4 Rubber feet
- ✓ 1 Set of rack "ears"
- ✓ Kramer RC-IR3 Infrared Remote Control Transmitter with batteries and user manual



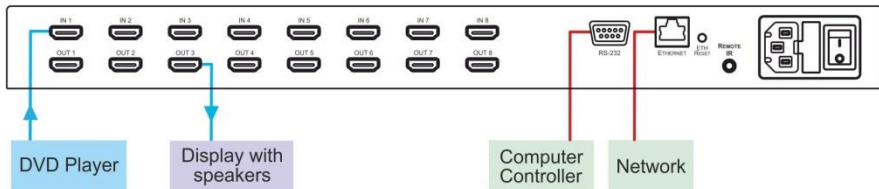
Save the original box and packaging in case your VS-88HN needs to be returned to the factory for service.

### Step 2: Install the VS-88HN

Mount the machine in a rack (using the included rack "ears") or attach the rubber feet and place on a table.

### Step 3: Connect the inputs and outputs

Always switch off the power on each device before connecting it to your VS-88HN.



Always use Kramer high-performance cables for connecting AV equipment to the VS-88HN.

### Step 4: Connect the power

Connect the power cord to the VS-88HN and plug it into the mains electricity.



### Step 5: Operate the VS-88HN

Acquire the EDID from a connected output

1. Press and hold the EDID and STO buttons for 3 seconds. Both buttons flash.
2. Press the INPUT button that receives the EDID. The input number flashes on display.
3. Press the OUTPUT button where the display is connected.
4. Press the EDID button.
5. When the buttons stop flashing and the display returns to normal, the EDID is acquired.

Switch an input to an output

Press an output button followed by an input button to switch the pair

Store a preset

1. Set the device to the desired I/O setting.
2. Press the STO button. The STO button flashes.
3. Select an IN or OUT button to store the device setting.
4. Press the STO button to store the current setup.

Recall a preset

1. Press the RCL button. The RCL button flashes.
2. Press the relevant IN or OUT button.
3. Press the RCL button to recall the stored setting.

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# 1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Video Products.

Congratulations on purchasing your Kramer **VS-88HN** *8x8 HDMI Matrix Switcher*, which is ideal for the following typical applications:

- Conference room presentations
- Advertising applications
- Rental and staging

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## 2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual



Go to [http://www.kramerelectronics.com/support/product\\_downloads.asp](http://www.kramerelectronics.com/support/product_downloads.asp) to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

### 2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **VS-88HN** away from moisture, excessive sunlight and dust



This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

## 2.2 Safety Instructions



**Caution:** There are no operator serviceable parts inside the unit

**Warning:** Use only the power cord that is supplied with the unit

**Warning:** Do not open the unit. High voltages can cause electrical shock! Servicing by qualified personnel only

**Warning:** Disconnect the power and unplug the unit from the wall before installing

## 2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at <http://www.kramerelectronics.com/support/recycling/>.

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## 3 Overview

The **VS-88HN** is a high quality 8x8 matrix switcher for HDMI signals. It reclocks and equalizes the signal and can route any input to any or all outputs simultaneously.

In particular, the **VS-88HN** features:

- Up to 6.75Gbps data rate (2.25Gbps per graphics channel)  
Suitable for resolutions up to UXGA at 60Hz and for all HD resolutions.
- HDTV compatibility
- HDCP compliance
- HDMI support for Deep Color, x.v.Color™, Dolby® TrueHD, Dolby Digital Plus, DTS-HD®, and linear PCM 7.1 surround sound
- 3D pass-through
- I-EDIDPro™ Kramer Intelligent EDID Processing™ – Intelligent EDID handling & processing algorithm ensures Plug and Play operation for HDMI systems
- Kramer reClocking™ & Equalization Technology that rebuilds the digital signal to travel longer distances
- A lock button to prevent unwanted tampering with the buttons on the front panel
- 16 Preset memory locations for quick access to common configurations

You can control the **VS-88HN** using the front panel buttons, or remotely via:

- RS-232 serial commands transmitted by a PC, touch screen system or other serial controller
- The Kramer infrared remote control transmitter
- A PC connected to the Ethernet port on the device via a LAN
- An external remote IR receiver (optional), see [Section 3.2](#)

### 3.1 Defining the VS-88HN 8x8 HDMI Matrix Switcher

This section defines the **VS-88HN**.

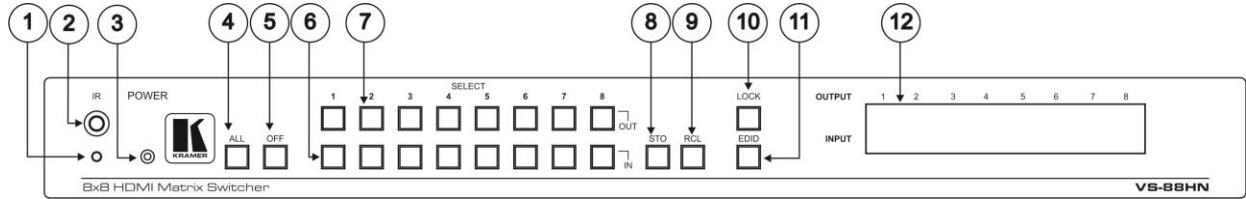


Figure 1: VS-88HN 8x8 HDMI Matrix Switcher Front Panel

#	Feature	Function	
1	IR Indication LED	Lights yellow when receiving signals from the infrared remote control transmitter	
2	IR Receiver	Signal receiver for the infrared remote control transmitter	
3	POWER LED	Lights when the device is turned on	
4	ALL Button	Press followed by an input button to connect the selected input to all outputs For example, press ALL and then Input button # 2 to connect input # 2 to all the outputs	
5	OFF Button	Press after pressing an output button to disconnect the selected output from the inputs. To disconnect all the outputs, press ALL followed by OFF	
6	SELECT Buttons	IN (1 to 8)	Press to select the input to switch after selecting an output (also used for storing machine setups (see <a href="#">Section 6.3</a> ))
7		OUT (1 to 8)	Press to select an output to switch followed by an input (also used for storing machine setups (see <a href="#">Section 6.3</a> ))
8	STO Button	Press to store the current switching setting to a preset (see <a href="#">Section 6.3</a> )	
9	RCL Button	Press to recall the current switching setting from a preset (see <a href="#">Section 6.3</a> )	
10	LOCK Button	Press and hold to toggle the locking/release of the front panel buttons. When storing or recalling presets, press to store or recall the preset (see <a href="#">Section 6.3</a> )	
11	EDID Button	Press to capture the EDID (see <a href="#">Section 6.2</a> )	
12	OUTPUT/INPUT 7-segment LED Display	Displays the input currently switched to the output which is marked above each input	



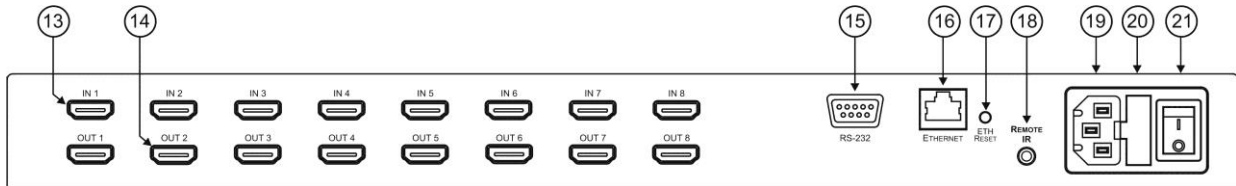


Figure 2: VS-88HN 8x8 HDMI Matrix Switcher Rear Panel

#	Feature	Function
13	<i>IN</i> HDMI Connectors (1 to 8)	Connect to up to 8 HDMI sources
14	<i>OUT</i> HDMI Connectors (1 to 8)	Connect to up to 8 HDMI acceptors
15	<i>RS-232</i> 9-pin D-sub Port Connector	Connect to a PC/serial controller
16	<i>ETHERNET</i> RJ-45 Connector	Connect to a PC via a LAN
17	<i>ETH RESET</i> Button	Press to reset to the factory default IP parameters: IP number – 192.168.1.39 Mask – 255.255.255.0 Gateway – 192.168.1.1  Depress the button while powering on the device. The device powers up with the factory default IP parameters
18	<i>REMOTE IR</i> Opening	Connect to an external IR receiver for controlling the device via and IR remote controller (see <a href="#">Section 3.2</a> )  Covered by a cap. The 3.5mm jack at the end of the internal IR connection cable fits into this opening
19	Mains Power Connector	Connect to the mains power
20	Mains Power Fuse	Fuse for protecting the device
21	Mains Power Switch	Switch for turning the device on or off

## 3.2 Using the IR Transmitter

You can use the **RC-IR3** IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver (Model: C-A35M/IRR-50). The external IR receiver can be located up to 15 meters away from the machine. This distance can be extended to up to 60 meters when used with three extension cables (Model: C-A35M/A35F-50).

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable (P/N: 505-70434010-S) with the 3.5mm connector that fits into the REMOTE IR opening on the rear panel. Connect the external IR receiver to the REMOTE IR 3.5mm connector.

## 4 Installing in a Rack

This section provides instructions for rack mounting the unit.

**Before installing in a rack**, be sure that the environment is within the recommended range:

OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing



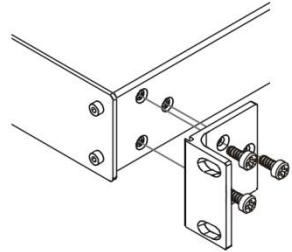
### CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

### To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

#### Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

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## 5 Connecting the VS-88HN 8x8 HDMI Matrix Switcher



Always switch off the power to each device before connecting it to your **VS-88HN**. After connecting your **VS-88HN**, connect its power and then switch on the power to each device.

To connect the **VS-88HN 8x8 HDMI Matrix Switcher** as illustrated in the example in [Figure 3](#):

1. Connect up to eight HDMI sources (for example, DVD players) to the IN HDMI connectors.  
You do not have to connect all the sources.
2. Connect the eight OUT HDMI connectors to up to eight HDMI acceptors (for example, LCD displays with built-in speakers).  
You do not have to connect all the outputs.
3. If required, connect a PC/controller to the RS-232 port (see [Section 6.6](#)) and/or the Ethernet port (see [Section 6.7](#)).
4. Connect the device to the mains electricity (not shown in [Figure 3](#)).
5. If necessary, acquire the EDID (see [Section 6.2](#))

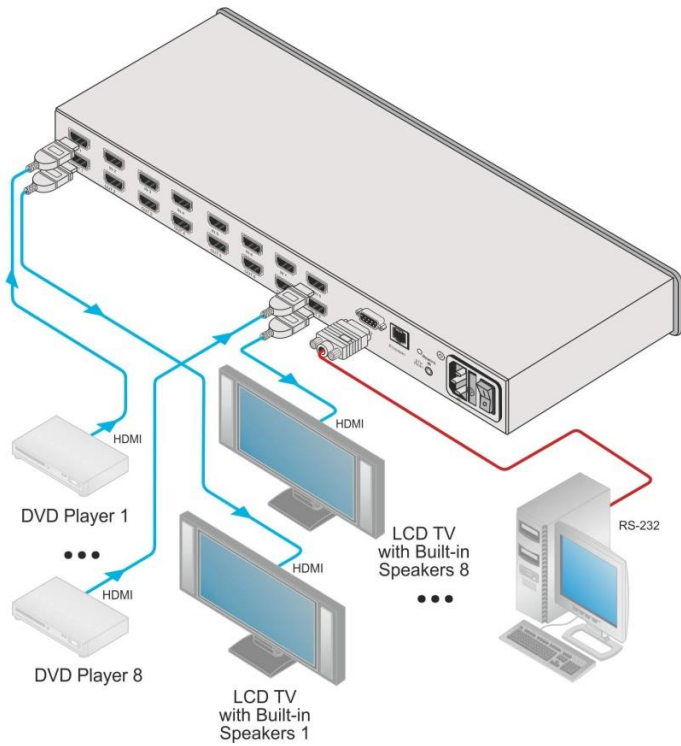


Figure 3: Connecting the VS-88HN 8x8 HDMI Matrix Switcher

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## 6 Operating the VS-88HN 8x8 HDMI Matrix Switcher

This section describes how to:

- Switch an input to an output (see [Section 6.1](#))
- Acquire the EDID (see [Section 6.2](#))
- Store and recall switch settings (see [Section 6.3](#))
- Reset the **VS-88HN** (see [Section 6.4](#))
- Switch between Protocol 2000 and Protocol 3000 (see [Section 6.5](#))
- Connect to the **VS-88HN** via RS-232 (see [Section 6.6](#))
- Connect to the **VS-88HN** via Ethernet (see [Section 6.7](#))
- Upgrade the firmware (see [Section 6.8](#))

### 6.1 Switching an Input to an Output

**To switch an input to an output:**

- Press an output button followed by an input button to switch the selected input to the selected output

### 6.2 Acquiring the EDID

You can acquire the EDID from any of the following:

- One output set to one or more of the eight inputs (see [Section 6.2.1](#))
- Different outputs set to different inputs (see [Section 6.2.2](#))
- The default EDID (see [Section 6.2.3](#))

**Note:** Attempting to acquire the EDID from an output that does not have a display device connected to it results in the default EDID being acquired.

## 6.2.1 Acquiring the EDID from One Output

**Note:** You can assign the EDID from one output to any or all of the eight inputs.

**To acquire the EDID from a display device connected to one of the outputs:**

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.  
Both buttons flash.
2. Press the input button to which the EDID is copied.  
The selected input number flashes on the display.
3. Select the output from which the EDID is to be acquired.
4. Press the EDID button.  
The EDID is stored when the display returns to normal and the EDID and STO buttons stop flashing.

## 6.2.2 Acquiring the EDID from Different Outputs to Different Inputs

**To acquire the EDID from several outputs (for example, OUT 1 to IN 1 and OUT 6 to IN 3):**

1. Connect the display devices to the outputs from which you want to acquire the EDIDs.
2. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.  
Both buttons flash.
3. Press the input button to which the EDID is copied (for example, IN 1).  
The selected input number flashes on the display.
4. Select the output from which the EDID is acquired (for example, OUT 1).
5. Press the IN 1 button.  
The IN 1 button stops flashing.
6. Press the next input button to which the EDID is copied (for example, IN 3).  
The selected input number flashes on the display.

7. Select the output from which the EDID is acquired (for example, OUT 6).
8. Press the IN 3 button.  
The IN 3 button stops flashing.
9. Press the input buttons to which you want to copy the EDID (for example, IN 1 and IN 3).
10. Make sure that the relevant input numbers flash on the display.
11. Press the EDID button.  
The process is complete when the display returns to normal.

### 6.2.3 Acquiring the Default EDID

**To store the default EDID on a selected input (for example, Input 2):**

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.  
Both buttons flash.
2. Press the input (for example, Input 2) to which the EDID is to be copied.  
The selected input number flashes on the display.
3. Press the OFF button until "0" (zero) appears on the display.
4. Press the EDID button.  
The default EDID is stored on the selected input when the display returns to normal.

## 6.3 Storing and Recalling a Setting

You can use the STO and RCL buttons to store up to 16 setups and then recall them using the OUT (1-8) and IN (9-16) SELECTOR buttons (see [Figure 4](#)).

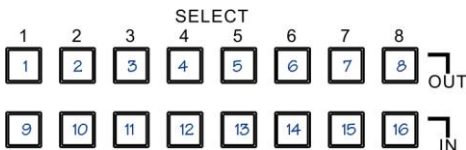


Figure 4: Store-Recall Button Configuration



### To store a preset (for example, to preset 10):

1. Configure the switching as required for the preset.
2. Press the STO button.  
The STO button flashes.
3. Select an OUT or IN SELECT button to store the device setting (for example, IN 2 for preset 10).
4. Press the STO button to store the current setup.  
You have to press the STO button within 10 seconds or the procedure automatically times out.

### To recall a preset (for example, preset 10):

1. Press the RCL button.  
The RCL button flashes.
2. Press the relevant OUT or IN button that stored the preset (for example, IN 2/preset 10).
3. Press the RCL button to recall the stored preset.  
The RCL button stops flashing.

## 6.4 Resetting the IP Parameters



This procedure resets only the IP related parameters. All switching and preset values remain unchanged.

### To reset the IP parameters to their default values (see [Section 8](#)):

- Press and hold the ETH Reset button on the rear panel while powering up the device

## 6.5 Switching Between Protocol 2000 and Protocol 3000

To switch from Protocol 2000 to Protocol 3000 and vice-versa using the front panel buttons:

- Press Output buttons 1 and 3 at the same time.  
Protocol 3000 is active.
- Press Output buttons 1 and 2 at the same time.  
Protocol 2000 is active.



Note that when sending consecutive protocol commands make sure to maintain at least a 200ms delay between commands.

After performing EDID get/store commands, a 1 sec delay is required before sending another protocol command.

## 6.6 Connecting via RS-232

You can connect to the **VS-88HN** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the product via RS-232:

- Connect the RS-232 9-pin D-sub on the rear panel of the **VS-88HN** via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need to be connected) to the RS-232 9-pin D-sub port on your PC

## 6.7 Connecting via Ethernet

You can connect to the **VS-88HN** via Ethernet using either of the following methods:

- Directly to the PC using a crossover cable (see [Section 6.7.1](#))
- Via a network hub, switch, or router, using a straight-through cable (see [Section 6.7.2](#))

**Note:** If you want to connect via a router and your IT system is based on IPv6, speak to your IT department for specific installation instructions.

After connecting the Ethernet port, you have to install and configure your Ethernet Port. For detailed instructions, see the "Ethernet Configuration (FC-11) guide.pdf" file in the technical support section at <http://www.kramerelectronics.com/support/faq.asp>.

### 6.7.1 Connecting the Ethernet Port directly to a PC

You can connect the Ethernet port of the **VS-88HN** directly to the Ethernet port on your PC using a crossover cable with RJ-45 connectors.



This type of connection is recommended for identifying the **VS-88HN** with the factory configured default IP address.

After connecting the **VS-88HN** to the Ethernet port, configure your PC as follows:

1. Click **Start > Control Panel > Network and Sharing Center**.
2. Click **Change Adapter Settings**.
3. Highlight the network adapter you want to use to connect to the device and click **Change settings of this connection**.

The Local Area Connection Properties window for the selected network adapter appears as shown in [Figure 5](#).

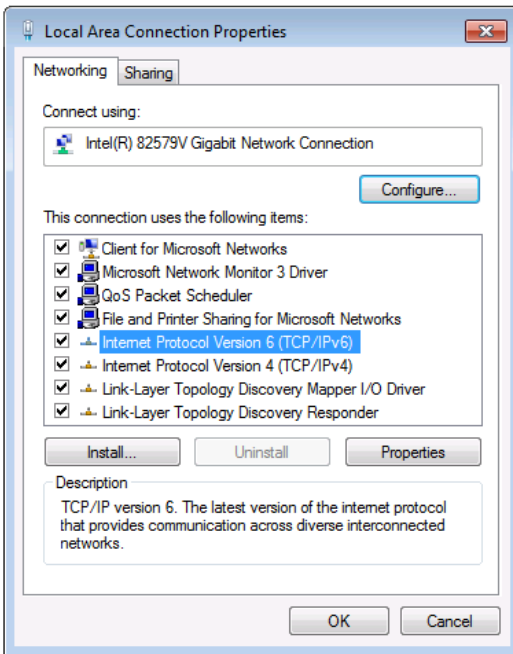


Figure 5: Local Area Connection Properties Window

4. Highlight either **Internet Protocol Version 6 (TCP/IPv6)** or **Internet Protocol Version 4 (TCP/IPv4)** depending on the requirements of your IT system.
5. Click **Properties**.

The Internet Protocol Properties window relevant to your IT system appears as shown in [Figure 6](#) or [Figure 7](#).

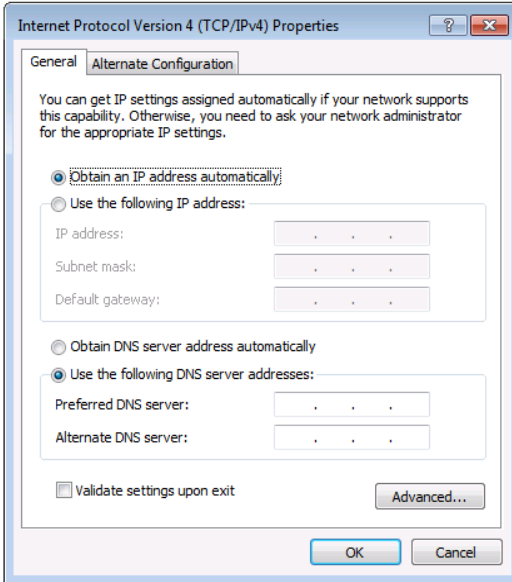


Figure 6: Internet Protocol Version 4 Properties Window

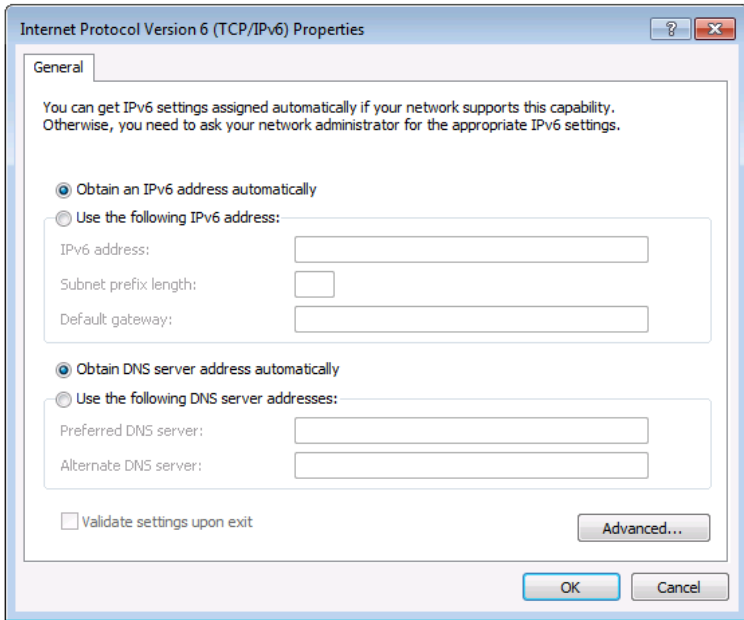


Figure 7: Internet Protocol Version 6 Properties Window

6. Select **Use the following IP Address** for static IP addressing and fill in the details as shown in [Figure 8](#).

For TCP/IPv4 you can use any IP address in the range 192.168.1.1 to 192.168.1.255 (excluding 192.168.1.39) that is provided by your IT department.

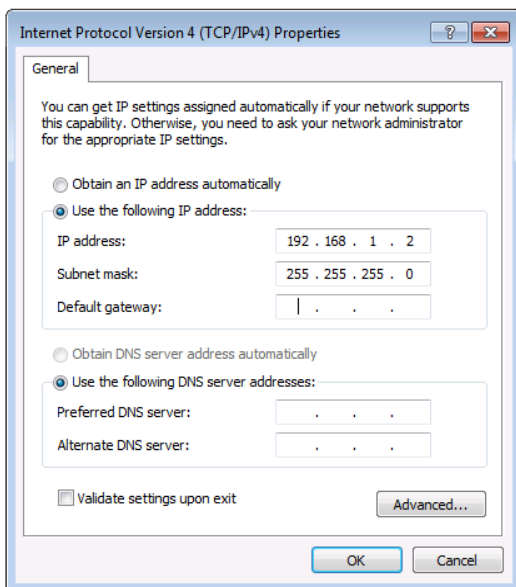


Figure 8: Internet Protocol Properties Window

7. Click **OK**.
8. Click **Close**.

### 6.7.2 Connecting the Ethernet Port via a Network Hub or Switch

You can connect the Ethernet port of the **VS-88HN** to the Ethernet port on a network hub or using a straight-through cable with RJ-45 connectors.

### 6.7.3 Control Configuration via the Ethernet Port

To control several units via Ethernet, connect the Master unit (Device 1) via the Ethernet port to the Ethernet port of your PC. Use your PC provide initial configuration of the settings (see [Section 6.4](#)).

## 6.8 Upgrading the Firmware

For instructions on upgrading the firmware see “*Upgrading the VS-88HN Firmware Using the STC Software*”.

## 7 Technical Specifications

INPUTS:	8 HDMI connectors
OUTPUTS:	8 HDMI connectors
MAX DATA RATE:	6.75Gbps data rate (2.25Gbps per graphics channel)
COMPLIANCE WITH HDMI STANDARD:	HDMI and HDCP
RESOLUTION:	Up to UXGA; 1080p
POWER CONSUMPTION:	100–240V AC, 50/60Hz, 40VA
CONTROLS:	Front panel buttons, infrared remote control transmitter, RS-232, Ethernet
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
DIMENSIONS:	19" x 7" x 1U (W, D, H)
WEIGHT:	2.1kg (4.6lbs) approx.
ACCESSORIES:	Power cord, IR transmitter, rack "ears"
OPTIONS:	External remote IR receiver cable
Specifications are subject to change without notice at <a href="http://www.kramerelectronics.com">http://www.kramerelectronics.com</a>	

## 8 Default Communication Parameters

RS-232			
Protocol 2000 (Default)		Protocol 3000	
Baud Rate	9600	Baud Rate	9600
Data Bits	8	Data Bits	8
Stop Bits	1	Stop Bits	1
Parity	None	Parity	None
Command Format	HEX	Command Format	ASCII
Example (Output 1 to Input 1)	0x01, 0x81, 0x81, 0x81	Example (Output 1 to Input 1)	#VID1>1<CR>

Switching Protocol			
P2000 → P3000		P3000 → P2000	
Command	0x38, 0x80, 0x83, 0x81	Command	#P2000<CR>
Front Panel	Press and hold Output 1 and Output 3 simultaneously	Front Panel	Press and hold Output 1 and Output 2 simultaneously

Ethernet			
IP Address	192.168.1.39	TCP Port	5000 or 10001 or 50000
Subnet Mask	255.255.255.0	UDP Port	50000



## 9 Default EDID

### Monitor

Model name..... VS-88HN  
Manufacturer..... KMR  
Plug and Play ID..... KRM0200  
Serial number..... 1  
Manufacture date..... 2010, ISO week 24  
-----  
EDID revision..... 1.3  
Input signal type..... Digital (DVI)  
Color bit depth..... Undefined  
Display type..... RGB color  
Screen size..... 700 x 390 mm (31.5 in)  
Power management..... Not supported  
Extension blocs..... 1 (CEA-EXT)  
-----  
DDC/CI..... Not supported

### Color characteristics

Default color space..... Non-sRGB  
Display gamma..... 2.20  
Red chromaticity..... Rx 0.640 - Ry 0.341  
Green chromaticity..... Gx 0.286 - Gy 0.610  
Blue chromaticity..... Bx 0.146 - By 0.069  
White point (default).... Wx 0.284 - Wy 0.293  
Additional descriptors... None

### Timing characteristics

Horizontal scan range.... 31-94kHz  
Vertical scan range..... 50-85Hz  
Video bandwidth..... 170MHz  
CVT standard..... Not supported  
GTF standard..... Not supported  
Additional descriptors... None  
Preferred timing..... Yes  
Native/preferred timing.. 1280x720p at 60Hz  
  Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 746 +hsync -vsync  
Detailed timing #1..... 1920x1080p at 60Hz (16:9)  
  Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync

### Standard timings supported

720 x 400p at 70Hz - IBM VGA  
720 x 400p at 88Hz - IBM XGA2  
640 x 480p at 60Hz - IBM VGA  
640 x 480p at 67Hz - Apple Mac II  
640 x 480p at 72Hz - VESA  
640 x 480p at 75Hz - VESA  
800 x 600p at 56Hz - VESA  
800 x 600p at 60Hz - VESA  
800 x 600p at 72Hz - VESA  
800 x 600p at 75Hz - VESA  
832 x 624p at 75Hz - Apple Mac II  
1024 x 768i at 87Hz - IBM

1024 x 768p at 60Hz - VESA  
 1024 x 768p at 70Hz - VESA  
 1024 x 768p at 75Hz - VESA  
 1280 x 1024p at 75Hz - VESA  
 1152 x 870p at 75Hz - Apple Mac II  
 1280 x 720p at 60Hz - VESA STD  
 1280 x 800p at 60Hz - VESA STD  
 1440 x 900p at 60Hz - VESA STD  
 1280 x 960p at 60Hz - VESA STD  
 1280 x 1024p at 60Hz - VESA STD  
 1400 x 1050p at 60Hz - VESA STD  
 1680 x 1050p at 60Hz - VESA STD  
 1600 x 1200p at 60Hz - VESA STD

#### EIA/CEA-861 Information

Revision number..... 3  
 IT underscan..... Not supported  
 Basic audio..... Supported  
 YCbCr 4:4:4..... Not supported  
 YCbCr 4:2:2..... Not supported  
 Native formats..... 1  
 Detailed timing #1..... 720x480p at 60Hz (4:3)  
   Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync  
 Detailed timing #2..... 1920x1080i at 60Hz (16:9)  
   Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync  
 Detailed timing #3..... 1920x1080i at 50Hz (16:9)  
   Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync  
 Detailed timing #4..... 1280x720p at 60Hz (16:9)  
   Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync  
 Detailed timing #5..... 1280x720p at 50Hz (16:9)  
   Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

#### CE video identifiers (VICs) - timing/formats supported

720 x 576p at 50Hz - EDTV (4:3, 16:15)  
 1280 x 720p at 50Hz - HDTV (16:9, 1:1)  
 1920 x 1080i at 60Hz - HDTV (16:9, 1:1)  
 1920 x 1080i at 50Hz - HDTV (16:9, 1:1)  
 1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]  
 1920 x 1080p at 60Hz - HDTV (16:9, 1:1)  
 1920 x 1080p at 50Hz - HDTV (16:9, 1:1)  
 NB: NTSC refresh rate = (Hz\*1000)/1001

#### CE audio data (formats supported)

LPCM 3-channel, 24-bits at 44/48 kHz

#### CE speaker allocation data

Channel configuration.... 7,1  
 Front left/right..... Yes  
 Front LFE..... No  
 Front center..... Yes  
 Rear left/right..... No  
 Rear center..... No  
 Front left/right center.. No  
 Rear left/right center... No

Rear LFE..... No

CE vendor specific data (VSDB)

IEEE registration number. 0x000C03

CEC physical address..... 1.0.0.0

Maximum TMDS clock..... 165MHz

Report information

Date generated..... 08/03/2011

Software revision..... 2.52.0.857

Data source..... Real-time 0x0031

Operating system..... 5.1.2600.2.Service Pack 3

# 10 Kramer Protocol 2000

The Kramer Protocol 2000 RS-232/RS-485 communication uses four bytes of information as defined below. All the values in the table are decimal, unless otherwise stated.

MSB								LSB
1st Byte	<b>DESTINATION</b>	<b>INSTRUCTION</b>						
0	D	N5	N4	N3	N2	N1	N0	
7	6	5	4	3	2	1	0	
2nd Byte	<b>INPUT</b>							
1	I6	I5	I4	I3	I2	I1	I0	
7	6	5	4	3	2	1	0	
3rd Byte	<b>OUTPUT</b>							
1	O6	O5	O4	O3	O2	O1	O0	
7	6	5	4	3	2	1	0	
4th Byte	<b>MACHINE NUMBER</b>							
1	OVR	X	M4	M3	M2	M1	M0	
7	6	5	4	3	2	1	0	

1st Byte: Bit 7 – Defined as 0  
 D – DESTINATION:  
 0 – Sends information to the switchers (from the PC)  
 1 – Sends information to the PC (from the switcher)  
 N5...N0 – INSTRUCTION

The 6-bit INSTRUCTION defines the function performed by the switcher(s). If a function is performed using the machine's keyboard, these bits are set with the INSTRUCTION NO. performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value set in N5...N0).

2nd Byte: Bit 7 – Defined as 1  
 I6...I0 – INPUT

When switching (i.e. instruction codes 1 and 2), the 7-bit INPUT is set as the input number to be switched. If switching is done using the machine's front panel, these bits are set with the INPUT NUMBER switched. For other operations, these bits are defined according to the table.

3rd Byte: Bit 7 – Defined as 1  
 O6...O0 – OUTPUT

When switching (i.e. instruction codes 1 and 2), the 7-bit OUTPUT is set as the output number to be switched. If switching is done using the machine's front panel, these bits are set with the OUTPUT NUMBER switched. For other operations, these bits are defined according to the table.

4th Byte: Bit 7 – Defined as 1  
 Bit 5 – Don't care  
 OVR – Machine number override  
 M4...M0 – MACHINE NUMBER

This byte is used to address machines in a system by their machine numbers. When several machines are controlled from a single serial port, they are usually configured together and each machine has an individual machine number. If the OVR bit is set, then all machine numbers accept (implement) the command and the addressed machine replies. When a single machine is controlled over the serial port, always set M4...M0 to 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Instruction Codes for Protocol 2000				
Instruction		Definition for Specific Instruction		Notes
#	Description	Input	Output	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 15
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3, 15
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3, 15
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is required	4, 3
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
56	CHANGE TO ASCII	0	Kramer protocol 3000	19
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - Protocol 2000 revision	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14

**NOTES** on the above table:

**NOTE 1** - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it resets according to the present power-down settings.

**NOTE 2** - These are bi-directional definitions. That is, if the switcher receives the code, it performs the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code

01            85            88            83

was sent from the PC, then the switcher (machine 3) switches input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher sends HEX codes:

41            81            87            83

to the PC.

When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

**NOTE 3** - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

**NOTE 4** - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

0B            80            80            85

would be HEX codes

4B            80            81            85

**NOTE 8** - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined / no valid input is detected; or 1 if it is defined / valid input is detected.

**NOTE 13** - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine sends its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):  
 7D            96            90            81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte).

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine sends its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):  
 7D            83            85            81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):  
 7D            D9            C3            81 (i.e. 128dec+ ASCII for "Y"; 128dec+ ASCII for "C").

**NOTE 14** - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code  
 3E            82            81            82 (ie. request the number of outputs)  
 would be HEX codes  
 7E            82            90            82  
 ie. 16 outputs

**NOTE 15** - When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) causes all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it performs any "video" instruction.

**NOTE 16** - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

**NOTE 19** - After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

# 11 Protocol 3000

By default, the **VS-88HN** is set to Protocol 2000 (see [Section 10](#)) but is also compatible with Kramer's protocol 3000.



Note that the **VS-88HN** needs to be set to protocol 2000 in order to use the IR remote control.

The **VS-88HN** can be operated using serial commands from a PC, remote controller or touch screen using the Kramer Protocol 3000.

This section describes:

- Kramer Protocol 3000 syntax (see [Section 11.1](#))
- Kramer Protocol 3000 commands (see [Section 11.2](#))

## 11.1 Kramer Protocol 3000 Syntax

### 11.1.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	<i>device_id@</i>	<b>Message</b>	<b>CR</b>

#### 11.1.1.1 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	<b>Command</b> <b>SP</b> <i>Parameter_1,Parameter_2,...</i>	<b>CR</b>

#### 11.1.1.2 Command String

Formal syntax with commands concatenation and addressing:

Start	Address	Body	Delimiter
#	<i>device_id@</i>	<b>Command_1</b> <i>Parameter1_1,Parameter1_2,...</i> <b>Command_2</b> <i>Parameter2_1,Parameter2_2,...</i> <b>Command_3</b> <i>Parameter3_1,Parameter3_2,...</i> ...	<b>CR</b>

### 11.1.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	<i>device_id@</i>	<b>Message</b>	<b>CR LF</b>

### 11.1.2.1 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	device_id@	Command <b>SP</b> [Param1 ,Param2 ...] <b>result</b>	<b>CR</b> <b>LF</b>

**CR** = Carriage return (ASCII 13 = 0x0D)

**LF** = Line feed (ASCII 10 = 0x0A)

**SP** = Space (ASCII 32 = 0x20)

### 11.1.3 Command Terms

#### Command

A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').

Command and parameters must be separated by at least one space.

#### Parameters

A sequence of alphanumeric ASCII characters ('0'-'9','A'-'Z','a'-'z' and some special characters for specific commands). Parameters are separated by commas.

#### Message string

Every command entered as part of a message string begins with a **message starting character** and ends with a **message closing character**.

**Note:** A string can contain more than one command. Commands are separated by a pipe ( '|') character.

#### Message starting character

'#' – For host command/query

'~' – For device response

#### Device ID (Optional, for K-NET)

K-NET Device ID followed by '@'

#### Query sign

'?' follows some commands to define a query request.

#### Message closing character

**CR** – For host messages; carriage return (ASCII 13)

**CRLF** – For device messages; carriage return (ASCII 13) + line-feed (ASCII 10)



### Command chain separator character

When a message string contains more than one command, a pipe ( '|' ) character separates each command.

Spaces between parameters or command terms are ignored.

#### 11.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial or Ethernet port on the Kramer device. To enter **CR** press the Enter key. (**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

#### 11.1.5 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

#### 11.1.6 Chaining Commands

Multiple commands can be chained in the same string. Each command is delimited by a pipe character ("|"). When chaining commands, enter the **message starting character** and the **message closing character** only once, at the beginning of the string and at the end.

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

#### 11.1.7 Maximum String Length

64 characters

## 11.2 Kramer Protocol 3000 Commands

Command	Short Form	Description	Permission
#		Protocol handshaking	End User
BUILD-DATE?		Read device build date	End User
CPEDID		Copy EDID data from the output to the input EEPROM	End User
DISPLAY?		Read if output is valid	End User
FACTORY		Reset to factory default configuration	
GETEDID		Read EDID data	User SW Internal
GETEDID-EXT		Read EDID data from external device connected to output	User SW Internal
HELP		List of commands	End User
IDV		Visual identify device	End User
INFO-IO?		Read in/out count	End User
INFO-PRST?		Read maximum preset count	End User
LDEDID		Load EDID data	User SW Internal
LOCK-FP	LCK	Lock front panel	Administrator
LOCK-FP?	LCK?	Read Lock front panel	End User
MODEL?		Read device model	End User
P2000		Switch to protocol 2000	End User
PROT-VER?		Read device protocol version	End User
PRST-LST?		Read saved presets list	End User
PRST-RCL		Recall saved preset	End User
PRST-STO		Store current connections to preset	End User
PRST-VID?		Read video connections from saved preset	End User
RESET		Reset device	Administrator
SIGNAL?		Read if input is valid	End User
SN?		Read device serial number	End User
VERSION?		Read device firmware version	End User
VID		Switch Video only	End User
VID?		Get Video switch state	End User

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**SAFETY WARNING**

Disconnect the unit from the power supply before opening and servicing



P/N: 2900-300155



Rev: 8